




Shoreline Restoration and Management Plan/ Draft Environmental Impact Statement

July 2012





National Park Service
U.S. Department of the Interior

Indiana Dunes National Lakeshore
Indiana

Shoreline Restoration and Management Plan / Draft Environmental Impact Statement

July 2012

**UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
SHORELINE RESTORATION AND MANAGEMENT PLAN /
DRAFT ENVIRONMENTAL IMPACT STATEMENT
Indiana Dunes National Lakeshore, Porter, Indiana
EXECUTIVE SUMMARY**

The *Shoreline Restoration and Management Plan / Draft Environmental Impact Statement* (EIS) has been prepared to provide scientifically-based alternatives for the restoration of natural sediment movement along the southern shore of Lake Michigan within and adjacent to Indiana Dunes National Lakeshore. The purpose of the plan / draft EIS is to provide comprehensive guidance for restoring natural shoreline processes, preserving shoreline ecosystems, and providing opportunities for quality visitor experiences at Indiana Dunes National Lakeshore. The intent of the plan / draft EIS is not to provide specific and detailed answers to every issue facing the park, but rather to provide a framework to assist National Park Service (NPS) managers, stakeholders, and locals governing bodies in making current and future decisions.

For the purpose of the plan / draft EIS the shoreline has been divided into four reaches based on sediment erosion and accretion. Due to the natural process-driven interconnectivity of these areas the draft EIS is formatted so that reaches 1 and 2, which extend from Crescent Dune to Willow Lane, and reaches 3 and 4, which extend from Willow Lane to the Gary-U.S. Steel East Breakwater, are discussed in the context of two independent sediment transport cells. The National Park Service will consider a no-action alternative (alternative A) in all reaches as a baseline of current conditions and management practices.

For reaches 1 and 2 seven alternatives were developed including the no-action alternative. All alternatives provide for beach nourishment at Crescent Dune differing in the source of material (upland versus dredged), method of placement (hydraulic versus mechanical), and frequency of placement (every year or every five years). Additionally, one of the alternatives incorporates a permanent bypass system, and another incorporates the construction of a temporary submerged cobble berm. Through a value analysis process the alternative that incorporated the submerged cobble berm was selected as the preferred alternative for reaches 1 and 2. This alternative provides the best combination of strategies resulting in a high level of protection of natural resources while providing for a wide range of beneficial uses of the environment. The berm will consist of natural, appropriate sized, glacially deposited aggregate

material, and will disperse over time (about five years) by wave action and storm events. Under this alternative an annual beach nourishment program would be used in conjunction with the construction of the berm.

For reaches 3 and 4 four alternatives were developed including the no-action alternative. All alternatives provide for beach nourishment at Portage Lakefront and Riverwalk differentiated by the frequency of nourishment (every year or every five years), and one includes the development of a permanent bypass system. Only dredged material was considered for these alternatives, because no viable access to the nourishment site exists for trucking in upland materials. Through a value analysis process the alternative that provides sediment nourishment every five years through a combination of mechanical and hydrologic means was selected as the preferred alternative for reaches 3 and 4. This alternative is cost efficient and provides the greatest potential for both foredune creation and protection from major storm events.

The plan / draft EIS will be available for public comment for a period of 60 days commencing when the U.S. Environmental Protection Agency publishes the Notice of Availability in the Federal Register. One public meeting will be held. The specific date, time, and location of the meeting will be announced in the local media, on the Internet, and by contacting the park's headquarters at 219-395-1772.

A copy of the plan / draft EIS is available on the internet on the NPS Planning, Environment, and Public Comment website at: <http://www.parkplanning.nps.gov/indu>. The plan / draft EIS can also be accessed through the park's home page at: <http://www.nps.gov/indu>. If you have any questions, please call Charles Morris, Environmental Protection Specialist, at 219-983-1352.

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SUMMARY

PURPOSE OF AND NEED FOR ACTION

The purpose of this *Shoreline Restoration and Management Plan / Draft Environmental Impact Statement* (EIS) is to provide comprehensive guidance for restoring natural shoreline processes, preserving the shoreline ecosystem, and providing opportunities for quality visitor experiences at Indiana Dunes National Lakeshore. The purposes of this plan / draft EIS are as follows:

- Ensure that the foundation for decision-making has been developed in consultation with the public and is adopted by National Park Service (NPS) leadership after sufficient analysis of the benefits and impacts of alternative courses of action.
- Develop strategies that would support the reestablishment of more sustainable shoreline sediment movement and a more natural ecosystem of shoreline vegetation, foredune and dune complexes.
- Define desired resource conditions for the shoreline, foredunes and dunes.
- Identify approaches for shoreline restoration and management that are consistent with a regional approach to management of the lakeshore that encourages maintenance of a natural shoreline and functioning ecosystems.

Prior to industrial and residential development along Lake Michigan, the shoreline was comprised of a highly diverse landscape including swamp and marsh lands, dunes, oak savanna, and prairies. The natural shoreline processes along southern Lake Michigan have been heavily impacted by the construction of numerous navigational harbors and hardened (man-made) structures that have greatly affected the integrity and sustainability of the natural landscape. These structures altered Lake Michigan's natural littoral drift, resulting in areas of sediment accretion (accumulation) east (updrift) of

Michigan City and the Port of Indiana, and sediment starvation to the west (downdrift) of these same harbors. The lack of continued sediment replenishment from natural littoral drift has resulted in extensive beach and dune erosion which threatens both public and private resources. Although the U.S. Army Corps of Engineers (COE) conducts beach nourishment on an intermittent basis and the staff at Indiana Dunes National Lakeshore conduct certain resource management actions to protect resources (such as sensitive plant and animal habitats), no specific shoreline restoration plan exists, and the impact of severe shoreline and beach erosion would compromise the park's outstanding ecological and biological diversity found within its boundaries. This plan / draft EIS is needed to:

- Address the severe shoreline and beach erosion and the impacts on dune ecology that are caused by interruptions to the natural processes along the shoreline, including the movement of sediment.
- Address the adverse impacts to the fragile shoreline ecosystem caused by the interrupted natural processes and sediment movement.
- Identify a series of management actions that can be implemented by park staff, as needed, to provide a balance between protection of the shoreline ecosystem and appropriate visitor enjoyment of the park.

OBJECTIVES IN TAKING ACTION

Objectives define what must be achieved for an action to be considered a success. Alternatives selected for detailed analysis must meet all objectives and must also resolve the purpose of and need for action.

Using the park's enabling legislation, mandates, and direction in other planning documents as well as NPS service-wide

objectives, NPS *Management Policies 2006*, and the NPS *Organic Act of 1916*, the staff of Indiana Dunes National Lakeshore identified the following management objectives relative to shoreline management at the park.

Shoreline Restoration

- Develop strategies that would support the reestablishment of more sustainable shoreline sediment movement and a more natural ecosystem of shoreline vegetation, foredune and dune complex.

Exotic and Invasive Species

- Develop strategies to identify, manage, and remove aquatic and terrestrial nonnative and invasive species.
- Develop strategies to support ongoing management efforts to remove aquatic and terrestrial nonnative and invasive species, and to prevent conditions detrimental to those efforts.

Management Methodology

- Determine shoreline desired conditions that would serve as thresholds for management actions within Indiana Dunes National Lakeshore.
- Develop and implement an adaptive management approach for maintaining a sustainable shoreline ecosystem within Indiana Dunes National Lakeshore.

ALTERNATIVES CONSIDERED

For the purpose of this plan / draft EIS, the shoreline has been divided into four reaches based on accretion and erosion rates. Proposed alternatives are presented for reaches 1 and 2 and reaches 3 and 4. Under all proposed action alternatives, the sediment

used for beach nourishment would be compatible with native site sediment, meaning similar in terms of color, shape, size, mineralogy, compaction, organic content, and texture. Beach nourishment material would be free of harmful chemical contaminants, trash, debris, and large pieces of organic material. Placement of the nourishment material would be conducted in a manner to avoid or minimize potential impacts on both natural resources and visitors of the park. The alternatives considered addressed the public's main concerns of protecting habitat, maintaining a natural viewshed, and not causing additional disruptions to sediment movement in the area.

Once this plan is completed, several of the nourishment activities proposed under the alternatives could be implemented without further compliance or study. Other more detailed studies and plans would be needed before some specific actions could be implemented, including design specifications. These additional plans and studies would include an in-depth analysis of potential impacts.

Reaches 1 and 2

The National Park Service would continue current management practices. For the foreseeable future, there would be no new actions taken to restore the park shoreline. For reaches 1 and 2 seven alternatives were developed including the no-action alternative. All alternatives provide for beach nourishment at Crescent Dune differing in the source of material (upland versus dredged), method of placement (hydraulic versus mechanical), and frequency of placement (every year or every five years). Additionally, one of the alternatives incorporates a permanent bypass system, and another incorporates the construction of a temporary submerged cobble berm. Through a value analysis process the alternative that incorporated the submerged cobble berm was selected as the preferred alternative for reaches 1 and 2. This alternative provides the

best combination of strategies resulting in a high level of protection of natural resources while providing for a wide range of beneficial uses of the environment. The submerged cobble berm would consist of natural, appropriate sized, glacially deposited aggregate material, and would disperse over time (about five years) by wave action and storm events. Under this alternative an annual beach nourishment program would be used in conjunction with the construction of the berm.

Reaches 3 and 4

The National Park Service would continue current management practices. For the foreseeable future, there would be no new actions taken to restore the park shoreline. For reaches 3 and 4 four alternatives were developed including the no-action alternative. All alternatives provide for beach nourishment at Portage Lakefront and Riverwalk differentiated by the frequency of nourishment (every year or every five years), and one includes the development of a permanent bypass system. Only dredged material was considered for these alternatives, because no viable access to the nourishment site exists for trucking in upland materials. Through a value analysis process the alternative that provides sediment nourishment every five years through a combination of mechanical and hydrologic means was selected as the preferred alternative for reaches 3 and 4. This alternative is cost efficient and provides the greatest potential for both foredune creation and protection from major storm events.

Terrestrial Management Actions

In addition to the shoreline restoration alternatives, natural resource management strategies are proposed for the protection and improvement of the park's terrestrial ecosystem. Plant communities and physiography are continually changing with the disturbance-prone habitats of the

foredune complex. The foredune and dune complex encourages biological diversity unique to this region of the country. Migratory bird habitat, intradunal wetlands, and the various stages of dune succession are critical components of the park. The National Park Service is responsible for the protection of these sensitive habitats. Protection is currently accomplished with the following management strategies:

- preservation or restoration of sensitive habitat
- management of nonnative invasive plant species
- reduction of anthropogenic influences on native dune vegetation and critical habitat

ENVIRONMENTAL CONSEQUENCES

The analysis of environmental consequences considers the actions being proposed and the cumulative effects from occurrences inside and outside Indiana Dunes National Lakeshore. The analysis addresses the potential environmental consequences of the actions for coastal processes, including sediment transport and dune formation, aquatic fauna, terrestrial habitat, threatened and endangered species and species of concern, wetlands and pannes, soundscape, visitor experience, and park operations.

In analyzing the impacts on natural resources, all action alternatives would benefit coastal processes. There would be adverse effects on aquatic fauna, terrestrial habitat, threatened and endangered species and species of concern, and soundscape as a result of activities associated with the placement of nourishment material. The duration and intensity of these effects would vary depending on the source of the nourishment material (i.e., upland or dredged) and the volume of nourishment material proposed under each alternative. Under the NPS preferred alternative (alternative E) in reaches 1 and 2, effects on all resources would be no greater than moderate and adverse. Under the

SUMMARY

NPS preferred alternative (alternative C-5) in reaches 3 and 4, effects would be no greater than short-term, moderate, and adverse on all resources except aquatic fauna. There would be long-term, moderate to major, adverse impacts on aquatic fauna as fish would be displaced during nourishment activities and fish life cycles would be interrupted. In addition, the larger footprint of the placement area under alternative C-5 in reaches 3 and 4 (when compared to the other action alternatives) would result in adverse effects to

benthic communities along most of reach 3. However, under all the action alternatives, the impacted resources (e.g., coastal processes, aquatic fauna, terrestrial habitat, threatened and endangered species and species of concern, and soundscape) would benefit in the long term from the reduction of severe shoreline and beach erosion and the creation of a more natural ecosystem of shoreline vegetation and foredune and dune complexes and processes.

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Acronyms

CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
CSSC	Chicago Sanitary and Ship Canal
CZMA	Coastal Zone Management Act
dBA	A-weighted decibel
<i>E. coli</i>	<i>Escherichia coli</i>
EA	environmental assessment
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ft./yr.	feet per year
FWS	U.S. Fish and Wildlife Service
GHG	greenhouse gas
IDNR	Indiana Department of Natural Resources
LIDAR	Light Detection and Ranging
m ³	cubic meters
mtCO ₂ e	metric tons of carbon dioxide equivalent
NEPA	National Environmental Policy Act of 1969, as amended
NHPA	National Historic Preservation Act, as amended
NIPSCO	Northern Indiana Public Service Company
NPS	National Park Service
PEPC	Planning Environment and Public Comment
SHPO	State Historic Preservation Officer
U.S.	United States
USC	United States Code
USGS	U.S. Geological Survey
yds ³	cubic yards

A GUIDE TO THIS DOCUMENT

This *Shoreline Restoration and Management Plan / Draft Environmental Impact Statement* (EIS) is organized into five chapters plus appendixes. Each section is described briefly below.

The “Purpose and Need for Action” chapter describes the context for the entire draft EIS. It explains why this plan is being prepared and what issues it addresses. It provides guidance (e.g., park purpose, significance, resources and values, special mandates, and service-wide laws and policies) for the alternatives that are considered. The “Purpose and Need for Action” chapter also describes how this plan relates to other plans and projects and identifies impact topics to be discussed relative to the no-action alternatives. It also includes a discussion of impact topics that were dismissed from detailed analysis.

“The Alternatives” chapter discusses management zones and the management alternatives. Mitigating measures for minimizing or eliminating impacts of some proposed actions are presented. A section on the selection of the preferred alternative and environmentally preferable alternative follows.

The “Affected Environment” chapter describes areas and resources that would be affected by actions that are part of the various alternatives — including coastal processes, aquatic fauna, terrestrial habitat, threatened and endangered species and species of concern, wetlands and pannes, soundscape, visitor experience, and park operations.

The “Environmental Consequences” chapter analyzes the impacts of implementing the alternatives. Approaches used to assess impacts are outlined at the beginning of the “Environmental Consequences” chapter.

The “Consultation and Coordination” chapter describes the history of public and agency coordination during the planning effort; it also lists agencies and organizations that will receive copies of the draft EIS.

The appendixes present information on enabling legislation, technical references, species lists, and initial agency consultation.



CHAPTER 1

Purpose and Need for Action



INTRODUCTION

Indiana Dunes National Lakeshore was created by the United States (U.S.) Congress in 1966, and is one of four national lakeshores in the U.S., all on the Great Lakes. Legislation providing for the establishment of the Indiana Dunes National Lakeshore is included in Appendix A: Enabling Legislation. These national lakeshores share certain challenges associated with balancing impacts of human actions within fragile natural environments. Indiana Dunes National Lakeshore faces challenges unique among national lakeshores in managing and operating within a natural environment that has been considerably altered.

Prior to industrial and residential development along Lake Michigan, the shoreline was comprised of a highly diverse landscape including swamp and marsh lands, dunes, oak savanna, and prairies. The natural shoreline processes along southern Lake Michigan have been heavily impacted by the construction of numerous navigational harbors and hardened (man-made) structures that have greatly affected the integrity and sustainability of the natural landscape. These structures outside of Indiana Dunes National Lakeshore altered Lake Michigan's natural east-to-west littoral drift (or longshore drift, defined as movement of sediment along the coast). Lake Michigan's waves usually surge onto the beach at an oblique angle with their swash taking sediment up and along the beach, resulting in areas of sediment accretion (accumulation) east (updrift) of Michigan City and Port of Indiana, and sediment starvation to the west (downdrift) of these same harbors. The lack of continued sediment replenishment from natural littoral drift has resulted in extensive beach and dune erosion which threatens both public and private resources.

The continued erosion along Indiana Dunes National Lakeshore west of Michigan City and Port of Indiana has been mitigated to a certain degree through beach nourishment

and offshore placement of sediment conducted by the U.S. Army Corps of Engineers (COE) (see "The Alternatives" chapter for details). Beach nourishment or replenishment is a process by which sediment lost through littoral drift or erosion is replaced from sources outside of the eroding beach. Due to the continuing issue of erosion along the lakeshore and the lack of a systematic means of finding a remedy, the National Park Service decided to address the issue with a shoreline restoration management plan.

The National Park Service began public involvement early. Conversations have been held for years with state, federal, and municipal entities within the boundaries of the Indiana Dunes National Lakeshore about the problems. Once the decision was made to move forward with the development of a plan, the National Park Service began a formal scoping process, which is an open process for determining the scope of a proposed action or project and for identifying issues related to the project (see the "Consultation and Coordination" chapter for more detail). The National Park Service actively engaged the public, stakeholders, and government officials at the federal, state, and local levels through the use of public meetings and project newsletters and by providing the opportunity to provide comments.

The National Park Service invited the COE and the State of Indiana to be cooperating agencies on this plan / draft EIS to give them the opportunity to provide information in their areas of technical expertise and to review and comment on early versions of this plan / draft EIS. The COE agreed to be a cooperating agency and a Memorandum of Understanding was executed between the National Park Service and the COE (included in Appendix B: Initial Agency Coordination). The State of Indiana declined to participate as a cooperating agency.

The development of this plan / draft EIS was facilitated by funds provided to the National Park Service through the Great Lakes Restoration Initiative, administered by the U.S. Environmental Protection Agency (EPA). The Great Lakes Restoration Initiative, the largest investment in the Great Lakes in two decades, involves a task force of 11 federal agencies which developed a plan to cover five urgent focus areas, including:

- cleaning up toxins and areas of concern
- combating invasive species
- promoting nearshore health by protecting watersheds from polluted run-off
- restoring wetlands and other habitats
- working with partners on outreach

PURPOSE AND NEED FOR THE PLAN

PURPOSE

The purpose of this plan is to provide comprehensive guidance for restoring natural shoreline processes, preserving the shoreline ecosystem, and providing opportunities for quality visitor experiences at Indiana Dunes National Lakeshore. The approved plan will guide the National Park Service (NPS) in best fulfilling the park's purpose.

This plan describes how the National Park Service generally proposes to manage the shoreline at Indiana Dunes National Lakeshore for the next 20 years or more. In particular it describes approaches to beach nourishment within the park and proposes additional strategies to address the shoreline management issues. Additional planning and environmental compliance would be completed as necessary to implement this plan. The plan should:

- Ensure that the foundation for decision-making has been developed in consultation with the public and is adopted by NPS leadership after sufficient analysis of the benefits and impacts of alternative courses of action.
- Develop strategies that would support the reestablishment of more sustainable shoreline sediment movement and a more natural ecosystem of shoreline vegetation, foredune and dune complexes.
- Define desired resource conditions for the shoreline, foredunes and dunes.
- Identify approaches for shoreline restoration and management that are consistent with a regional approach to management of the lakeshore that encourages maintenance of a natural shoreline and functioning ecosystems.

NEED

The plan is needed to:

- Address the severe shoreline and beach erosion and the impacts on dune ecology that are caused by interruptions to the natural processes along the shoreline, including the movement of sediment.
- Address the adverse impacts to the fragile shoreline ecosystem caused by the interrupted natural processes and sediment movement.
- Identify a series of management actions that can be implemented by park staff, as needed, to provide a balance between protection of the shoreline ecosystem and appropriate visitor enjoyment of the park.



GOALS AND OBJECTIVES FOR TAKING ACTION

Any plan the park develops must be consistent with the laws, regulations, and policies that guide the National Park Service. Objectives are “what must be achieved to a large degree for the action to be considered a success” (NPS 2001). All alternatives selected for detailed analysis must meet all objectives to a large degree, and they must resolve the purpose and need for action. Objectives for

shoreline restoration must be grounded in the park's enabling legislation, purpose, significance, and mission goals, and they must be compatible with the direction and guidance provided by the park's Statement for Management. See Appendix A: Enabling Legislation for additional information. The following objectives related to shoreline restoration were developed for this plan.

Shoreline Restoration

- Develop strategies that would support the reestablishment of more sustainable shoreline sediment movement and a more natural ecosystem of shoreline vegetation, foredune and dune complexes.

Exotic and Invasive Species

- Develop strategies to identify, manage, and remove aquatic and terrestrial exotic and invasive species; and
- Develop strategies to support ongoing management efforts to remove aquatic and terrestrial exotic and invasive species, and to prevent conditions detrimental to those efforts.



Management Methodology

- Determine shoreline desired conditions that would serve as thresholds for management actions within Indiana Dunes National Lakeshore; and
- Develop and implement an adaptive management approach for maintaining a sustainable shoreline ecosystem within Indiana Dunes National Lakeshore.

To meet the goals and objectives of the project, this plan proposes and analyzes various alternatives and their respective impacts on the environment. This draft EIS has been prepared in accordance with the National Environmental Policy Act of 1969, as amended (NEPA) and regulations of the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1508.9).

PROJECT LOCATION

Indiana Dunes National Lakeshore is approximately 50 miles southeast of Chicago, Illinois, in the counties of Lake, Porter, and LaPorte in northwest Indiana's industrial-urban corridor. The project area encompasses 21 miles of the shoreline (see Map 1: Park Map). The park is located at the southernmost point of Lake Michigan. Under this plan, the National Park Service would implement specific restoration and management actions within its boundaries. As shown on Map 1: Park Map, Indiana Dunes National Lakeshore shares its boundaries with various residential, agricultural, and industrial developments.

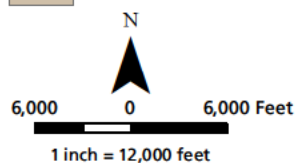
The project area for this plan / draft EIS does not include the entire Indiana Dunes National

Lakeshore; it includes only the shoreline, foredunes, and dunes as generally shown on the Project Area Map (map 2). For purposes of analysis and the development of shoreline restoration actions, the project planning team considered the entirety of the Lake Michigan shoreline along Indiana Dunes National Lakeshore. The project encompasses the area from the water's edge outward to the depth at which sediment on the lake bottom is no longer affected by wave action, and from the water's edge inland to include the foredune and dune complexes. Foredunes are low, very active dunes that parallel the beach and are named for their position as the first (fore) dunes inland from the beach.



Legend

- Indiana Dunes National Lakeshore
- State and Local Parkland

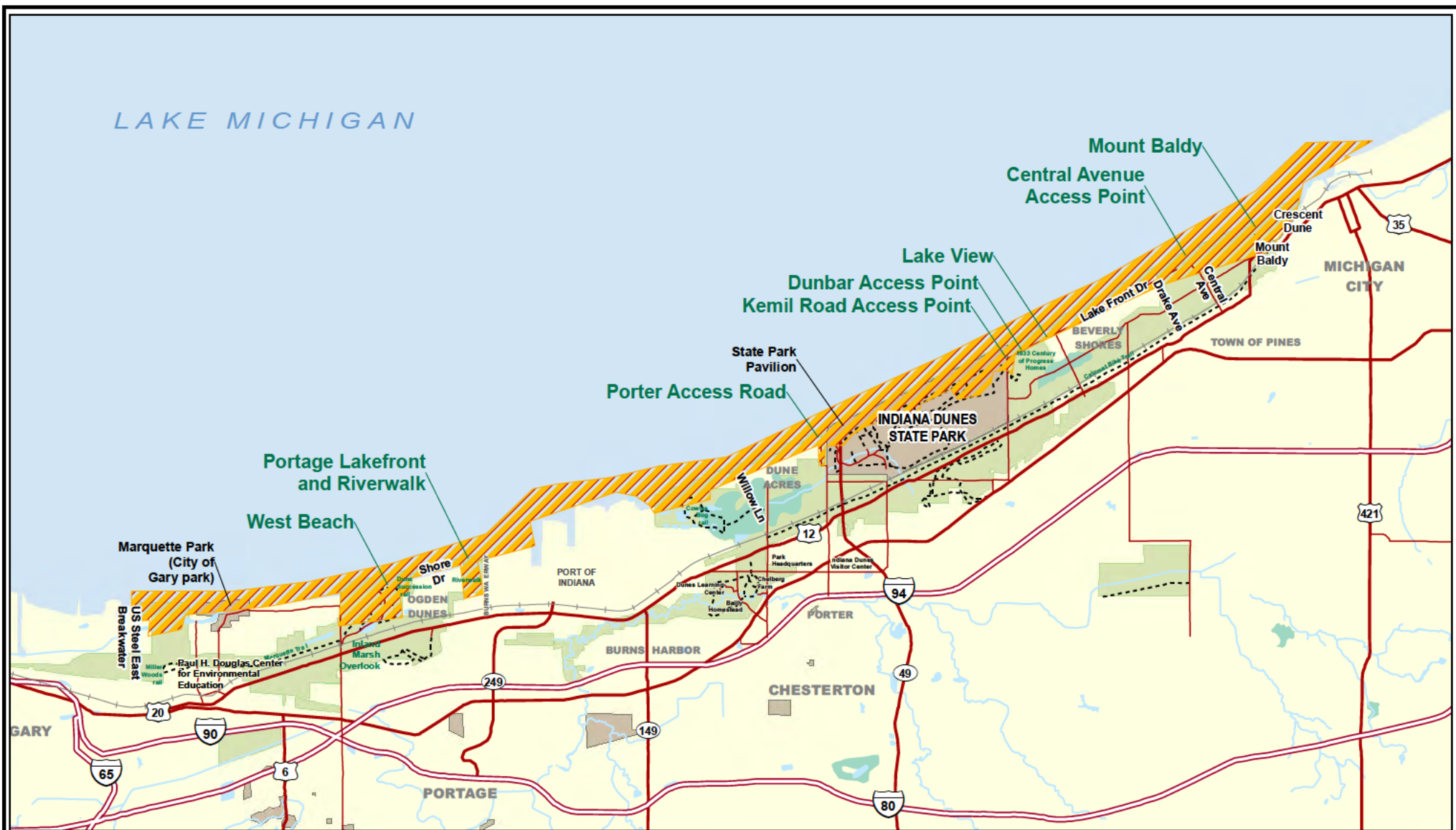


MAP 1 PARK MAP


Indiana Dunes National Lakeshore
Shoreline Restoration and Management
Plan / Environmental Impact Statement

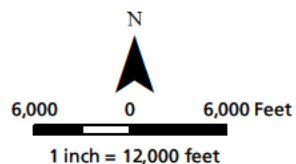
National Park Service / U.S. Department of the Interior

March 2012



Legend

 Project Area



MAP 2

PROJECT AREA MAP

Indiana Dunes National Lakeshore
Shoreline Restoration and Management
Plan / Environmental Impact Statement

National Park Service / U.S. Department of the Interior

March 2012

PARK BACKGROUND

HISTORY OF INDIANA DUNES NATIONAL LAKESHORE

Henry Cowles, a botanist from the University of Chicago who long championed the study of plant ecology, helped bring international attention to the intricate ecosystems of Indiana's dunes. Residents of the area and the region recognized the value of the dunes, and first proposed a national park in 1915. While supporters of the idea continued to pursue this effort for the next 50 years, other parties sought industrial uses and proposed the creation of the Port of Indiana.

In 1963, President John F. Kennedy proposed "the Kennedy Compromise" that allowed both a national park and a port. In 1966, Illinois Senator Paul H. Douglas sponsored legislation (Public Law 89-761) that authorized Indiana Dunes National Lakeshore, which included 8,330 acres of land and water.

Indiana Dunes National Lakeshore enabling legislation was passed by Congress on November 5, 1966 to:

Preserve for the educational, inspirational, and recreational use of the public certain portions of the Indiana Dunes and other areas of scenic, scientific, and historic interest and recreational value in the State of Indiana.

Four subsequent expansions (1976, 1980, 1986, and 1992) increased the size of the park to more than 15,000 acres.

OVERVIEW OF THE PARK'S ECOSYSTEM

Biological diversity is one of the most important features of Indiana Dunes National Lakeshore. This diversity is many times

greater than that of most areas of similar size because the park is in several ecological transition zones, including where the northern conifers meet the temperate hardwood forests of the northern and eastern U.S. and the tallgrass prairies of the Midwest. Indiana Dunes National Lakeshore contains more than 1,445 species of vascular plants, of which 1,135 are native. Indiana Dunes National Lakeshore ranks third highest with respect to floristic diversity within all national park system units. This exceptional biological diversity was a primary reason for the establishment of Indiana Dunes National Lakeshore.

Indiana Dunes National Lakeshore is located in the midst of an urban and industrial setting. The setting, combined with increased visitation at the park, has resulted in potential threats to the park's ecosystem. For example, a number of sensitive and rare plant species have been extirpated from the park due to human impacts.

INDIANA DUNES NATIONAL LAKESHORE'S PURPOSE AND SIGNIFICANCE

Park Purpose

The park purpose is a clear statement of why Congress established Indiana Dunes National Lakeshore. Statements of purpose are grounded in a thorough analysis of the park's legislation and legislative history. Purpose statements go beyond a restatement of the law to document shared assumptions about what the law means in terms specific to the park.

The purpose of Indiana Dunes National Lakeshore is to preserve, restore, and protect outstanding ecological and biological diversity along with geologic features that characterize the southern shore of Lake Michigan. The park also provides opportunities for the

public to experience natural scenic open spaces, historic features, and educational, scientific, inspirational, and recreational opportunities in proximity to urban areas.

Park Significance

- The park contains exceptional biological diversity and outstanding floral richness, resulting from the combination of complex geologic processes and the convergence of several North American life zones.
- The park's cultural resources represent the cultural evolution of northern Indiana from prehistoric times to the present day.
- The park's extensive reach of undeveloped dunes provides educational, inspirational, and recreational opportunities within a one-hour drive of a large metropolitan area.
- The park offers outstanding opportunities for scientific research due to the diversity and complexity of its natural systems and its history as a dynamic laboratory for early plant succession and faunal studies.
- The dunes provide a striking physical and emotional relief to the surrounding highly developed and flat landscape.

RELATIONSHIP OF PARK PLANNING DOCUMENTS TO OTHER GUIDING LAWS, POLICIES, PLANS, AND CONSTRAINTS

FEDERAL LAWS AND ORDERS

Several federal laws and orders influence the actions presented in this plan / draft EIS and must be considered and adhered to. The following sections present federal laws and orders that are relevant to this plan / draft EIS.

Endangered Species Act of 1973, as Amended

The purpose of the Endangered Species Act is to conserve “the ecosystems upon which endangered and threatened species depend” and to conserve and recover listed species. Endangered means a species is in danger of extinction; threatened means a species is likely to become endangered. The law also requires federal agencies to consult with the U.S. Fish and Wildlife Service (FWS) to ensure that the actions they take, including actions chosen under the proposed alternatives presented in the draft EIS, do not jeopardize listed species or designated critical habitat.

Coastal Zone Management Act of 1972

The Coastal Zone Management Act (CZMA) encourages the management of coastal zone areas and provides grants to be used in maintaining coastal zone areas. It requires that federal agencies be consistent in enforcing the policies of state coastal zone management programs when conducting or supporting activities that affect a coastal zone. It is intended to ensure that federal activities are consistent with state programs for the protection and, where possible, enhancement of the nation's coastal zones. The Act's definition of a coastal zone includes coastal waters extending to the outer limit of state submerged land title and ownership, and adjacent shorelines and land extending

inward to the extent necessary to effectively manage shorelines. A coastal zone includes islands, beaches, transitional and intertidal areas, and salt marshes.

To comply with the CZMA, the federal agency must identify activities that would affect the coastal zone defined above, including restoration projects, and review the state coastal zone management plan to determine whether the activity would be consistent with the plan.

Executive Order 11990, “Protection of Wetlands”

Executive Order 11990, “Protection of Wetlands” directs the National Park Service to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

NPS LAWS, POLICIES, AND GUIDANCE

NPS Organic Act of 1916

By enacting the *NPS Organic Act of 1916*, Congress directed the National Park Service to manage units of the national park system “to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (16 *United States Code* [USC] 1). The Redwood National Park Expansion Act of 1978 reiterates this mandate by stating that the National Park Service must conduct its actions in a manner that will ensure no “derogation of the values and purposes for which these various areas have been

established, except as may have been or shall be directly and specifically provided by Congress” (16 USC 1a-1).

National Park Service *Management Policies 2006*

The National Park Service *Management Policies 2006* provides further interpretation and policy guidance relative to laws, proclamations, executive orders, regulations, and specific directives. Several sections from NPS *Management Policies 2006* are relevant to aquatic and terrestrial ecological management in Indiana Dunes National Lakeshore, as described below.

The National Park Service *Management Policies 2006* instructs park units to:

- “Develop effective strategies, methods, and technologies to (1) restore disturbed resources, and (2) predict, avoid, or minimize adverse impacts on natural and cultural resources and on visitors and related activities.”
- “Determine the causes of natural resource management problems and identify alternative strategies for potentially resolving them” (NPS 2006, section 4.2.1).

The National Park Service *Management Policies 2006* also instructs park units to maintain, as part of the natural ecosystems of parks, all native plants and animals. The National Park Service achieves this maintenance by “preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur” (NPS 2006, section 4.4.1).

Furthermore, the National Park Service “will adopt park resource preservation, development, and use management strategies that are intended to maintain the natural population fluctuations and processes that

influence the dynamics of individual plant and animal populations, groups of plant and animal populations, and migratory animal populations in parks” (NPS 2006, section 4.4.1.1).

Whenever the National Park Service identifies a possible need for reducing the size of a park plant or animal population, the decision is based on scientifically valid resource information that has been obtained through consultation with technical experts, literature review, inventory, monitoring, or research. The planning team was assembled to complete this task (NPS 2006, section 4.4.2.1).

Also, whenever possible, “natural processes will be relied upon to maintain native plant and animal species, and to influence natural fluctuations in populations of these species. The [National Park Service] may intervene to manage individuals or populations of native species...management is necessary to protect specific cultural resources of parks; and to protect rare, threatened, or endangered species (NPS 2006, section 4.4.2).

The National Park Service *Management Policies 2006* indicates, “Natural shoreline processes (such as erosion, deposition, dune formation, overwash, inlet formation, and shoreline migration) will be allowed to continue without interference. Where human activities or structures have altered the nature or rate of natural shoreline processes, the National Park Service will, in consultation with appropriate state and federal agencies, investigate alternatives for mitigating the effects of such activities or structures and for restoring natural conditions. The National Park Service will comply with the provisions of Executive Order 11988, ‘Floodplain Management,’ and state coastal zone management plans prepared under the Coastal Zone Management Act of 1972” (NPS 2006, section 4.8.1.1). The language in section 4.8.1.1 goes on to state that the National Park Service will use the most feasible and effective methods to achieve natural resource management objectives while minimizing impacts.

Impairment. In addition to requiring the restoration of disturbed resources and the resolution of natural resource management problems, *NPS Management Policies 2006* (Section 1.4) requires analysis of potential effects to determine whether proposed actions would impair a park's resources and values.

The purpose of the national park system, established by the *Organic Act of 1916* and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of the park. That discretion is limited by the statutory requirement that the National Park Service must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including opportunities that would otherwise be present for the enjoyment of those resources or values (NPS 2006). Whether an impact meets this definition depends on the particular resource(s) that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects in relation to the impact.

An impact on any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park

- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park
- identified in the park's General Management Plan or other relevant NPS planning documents as being of significance

An impact would be less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and could not be further mitigated.

Impairment can result from visitor activities, NPS administrative activities, or activities undertaken by concessioners, contractors, and others operating in the park. Impairment can also result from sources or activities outside the park. Impairment findings do not apply to visitor experience, socioeconomics, public health and safety, environmental justice, land use, and park operations because impairment findings relate back to park resources and values. A determination of impairment will be prepared and made part of the Record of Decision for this plan / draft EIS.

Director's Order 12: Conservation Planning, Environmental Impacts Analysis, and Decision-making

NPS Director's Order 12: *Conservation Planning, Environmental Impacts Analysis, and Decision-making* and its accompanying handbook (NPS 2001) lay the groundwork for how the National Park Service complies with NEPA. Director's Order 12 and the handbook set forth a planning process for incorporating scientific and technical information and establishing an administrative record for NPS projects.

Director's Order 12 requires that impacts on park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision makers to understand the implications of those impacts

in the short and long term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists.

Natural Resource Management Reference Manual 77

The Natural Resource Management Reference Manual 77 provides guidance for NPS employees responsible for managing, conserving, and protecting the natural resources found in national park system units.

Director's Order 77-1: Wetland Protection and Procedural Manual #77-1

The purpose of Director's Order 77-1: *Wetland Protection and Procedural Manual #77-1* is to establish NPS policies, requirements, and standards for implementing Executive Order 11990, "Protection of Wetlands" (42 CFR 26961). Executive Order 11990 was issued in 1977 in order "to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative."

Temporary impacts to the existing beach wetlands would be unavoidable within the specific site where the shoreline would be nourished. The post-restoration shoreline would be expected to result in the same acreage of the same wetland type as exists now, but shifted northward (or at least maintained in its present position) because a comparable shoreline profile is expected to develop. Since there would be no net loss of the beach wetland habitat, the project could be considered under the Restoration Exception in section 4.2.1 (h) of NPS Director's Order 77-1: *Wetland Protection and Procedural Manual #77-1*.

Draft NPS Procedure Manual – Sediment Restoration and Beach Nourishment Guidelines (2011)

The purpose of the sediment restoration and beach nourishment guidelines is to assist NPS staff in planning and managing coastal sediment restoration projects. It focuses on shoreline and nearshore projects. The manual provides tools for resource managers to use in interfacing with partners that are completing technical designs to protect park resources. The guidelines provide a unified approach to coastal sediment management.

The information presented in this manual is focused on regions where extensive information was available. The recommendations presented are meant to be useful to parks considering coastal sediment restoration, but do not represent official NPS policy.

PARK PLANNING DOCUMENTS FOR INDIANA DUNES NATIONAL LAKESHORE

Indiana Dunes National Lakeshore does not exist separately from its surroundings. Several plans for areas within or near Indiana Dunes National Lakeshore could influence or be influenced by actions presented in this plan / draft EIS and must be considered. These relevant plans and studies are described below.

General Management Plan, 1997

The General Management Plan for Indiana Dunes National Lakeshore (1997a) is a comprehensive document for the park that combines the West Unit General Management Plan Amendment (1992), the Little Calumet River Corridor Plan (1991), and the East Unit General Management Plan Amendment (1997b). It defines the management philosophy and goals for the park for the next 20 years.

The 1997 General Management Plan summarizes and consolidates revisions made to the 1980 General Management Plan and discusses current and desired conditions related to natural resource management, transportation and parking, river access, and visitor use for each area of the park.

Implementation of the proposed project for shoreline restoration and management is consistent with the park's General Management Plan.

Fire Management Plan, 2004

The National Park Service *Management Policies 2006* require that all NPS areas with vegetation capable of sustaining fire develop a Fire Management Plan (USDA, USDI, *et al.* 1998). The purpose of this plan is to outline actions that would be taken by the park in meeting the fire management goals established for the park.

A Fire Management Plan is a detailed program of action to implement fire management policy and objectives. This plan outlines how wildland fires would be safely suppressed in an efficient, cost-effective manner; the role wildland fire management plays in the protection and management of natural and cultural resources; and how public and private property is to be protected from the impacts of wildland fires.

Invasive Plant Management Plan, Ongoing

The National Park Service is in the process of preparing an environmental assessment (EA) for a Great Lakes Invasive Plant Management Plan for Indiana Dunes National Lakeshore and several other national parks in the Great Lakes region.

The Invasive Plant Management Plan /EA is based on integrated pest management. Integrated pest management is defined as a

decision-making process that coordinates knowledge of pest biology, the environment, and available technology to prevent unacceptable levels of pest damage by cost-effective means, while posing the least possible risk to people and park resources. The scope of the Great Lakes Invasive Plant Management Plan /EA would be to identify long-term invasive plant management tools that would reduce the impacts of (or threats from) invasive plants to natural and cultural resources and provide opportunities for restoring native plant communities and cultural landscapes. The Invasive Plant Management Plan /EA would provide strategies for park staff to manage terrestrial and emergent wetland invasive plants on NPS-managed lands within the designated boundaries of the parks.

Memorandum on Mount Baldy Management Actions, 2011

The memorandum on Mount Baldy Management Actions from the Superintendent of Indiana Dunes National Lakeshore (NPS 2011a) describes current issues and potential management strategies for protection of Mount Baldy, the single most popular site for visitors to the park, from continued erosion. Similar problems elsewhere at the park were also cited, although the initial focus of management actions would be on Mount Baldy.

This memorandum describes the findings of an October 2010 management workshop on the subject, and outlined a series of goals with potential response strategies for each, as follows:

- stop people from going up or down the south slope
- restore areas denuded of vegetation by human actions
- designate an appropriate route from the top of the dune back to the parking lot to reduce damage to vegetation and the potential for

injuries caused by going down the south slope

- reduce social trail impacts to the resource
- achieve visitor compliance through education

OTHER PLANNING DOCUMENTS FOR SOUTHERN LAKE MICHIGAN

A number of existing external plans pertaining to the southern Lake Michigan shoreline area in northwest Indiana provide important context for this plan / draft EIS. While this plan / draft EIS need not be entirely consistent with these external plans and documents, a general consistency facilitates regional cooperation and collaboration opportunities. The key documents are identified and described below.

Marquette Plan, Phase I (2005) and Phase II (2008)

The Marquette Plan is a regional plan that creates a comprehensive land use vision for the Lake Michigan drainage basin and a strategy for implementation of that vision. The Marquette Plan established primary goals of increasing public access and developing the urbanized area.

Phase I of the Marquette Plan: The Lakeshore Reinvestment Strategy, was completed in 2005 and addressed public access and redevelopment of the lakeshore from the Illinois state line to the Port of Indiana. Phase II was completed in 2008 and compiled a range of general frameworks and recommendations for land use, green infrastructure at the watershed level, and transportation and access along the lakeshore from the Port of Indiana to the Michigan-Indiana state line.

Marquette Park Lakefront East Master Plan, City of Gary, 2008

The City of Gary recently received funding for the development of a plan for renovation and improvements to Marquette Park, which is located at the far west end of Indiana Dunes National Lakeshore. These capital improvements provide access to and circulation within the park, preserve and strengthen the park's natural features, provide new recreation and education amenities, and restore the park's signature historic facilities. Initial improvements have begun and completion is slated for 2012.

PROPOSED PLAN FOR IMPLEMENTATION

The proposed plan presents the first steps in a long-term process to return Indiana Dunes National Lakeshore to its natural condition.

For instance, various hardened structures have been placed along the shoreline as a result of industrial, federal, and residential development. These structures have historically provided protection for infrastructure from erosion and storm events. However, these structures were not always

developed in a way that was beneficial to the entire shoreline. The purpose of this draft EIS is to identify and develop strategies to restore the Indiana Dunes National Lakeshore shoreline and its processes. Reestablishment of more natural shoreline processes could eventually allow the current structures along the lakeshore to be removed in the future without endangering the adjacent infrastructure.

ISSUES AND IMPACT TOPICS

PLANNING ISSUES AND IMPACT TOPICS

Climate Change

Climate change refers to any substantial changes in average climatic conditions, such as average temperature, precipitation, or wind. Climate change also refers to considerable changes in climatic variability, such as seasonality or storm frequencies, which last for an extended period of time (decades or longer). The National Park Service recognizes that the main drivers of climate change are outside the control of the agency; climate change is a phenomenon with impacts that cannot be discounted, and which is likely already affecting Indiana Dunes National Lakeshore.

What scientists know is that higher air and water temperatures are already reducing winter ice cover on the Great Lakes, a trend which is expected to accelerate. Scientists believe that Lake Michigan may have some winters with no ice cover in as soon as 10 years. With less ice and more open waters, the lake will have more waves in winter than before, especially during strong storms, increasing erosion threats to park shorelines and structures. Also, because snow and ice cover protect dunes, beaches, and other shoreline features from erosion (by keeping them effectively frozen in place), shorelines are at greater risk of erosion in the future.

The U.S. Geological Survey (USGS), in partnership with the National Park Service, has assessed the possible effects of lake-level declines on the shorelines of three national lakeshores, Indiana Dunes, Sleeping Bear Dunes, and Apostle Islands, much as the U.S. Geological Survey has evaluated possible effects of sea-level rise on some coastal national parks. For these three national lakeshores, the U.S. Geological Survey identified the likelihood of changes in

shorelines based on six factors: erosion and accretion (build-up) rates, coastal slopes, relative projected lake-level changes, average wave heights, average ice cover, and geologic stability or susceptibility to changes. The shoreline at Indiana Dunes National Lakeshore has a high or very high potential of shoreline change. The vulnerable areas, mostly in the eastern portions of the lakeshore, include the Central Avenue access point and the beaches below Mount Baldy.

Recent climate change trends in the region of the park include:

- an increase in annual temperatures of 0.25°C per decade
- a progressive advance in the date of the last spring freeze
- increases in autumn precipitation
- doubling of frequencies of heavy rainfall events and an increase in the number of individual rainy days and week-long heavy rainfall events
- increased flooding
- an increase in the number of heat waves and record-high temperatures (Hayhoe *et al.* 2010)

While it is well accepted that climate change is occurring, the rate and severity of impacts at the park is, as yet, undefined. Extreme weather events have historically been documented in the area of the park, specifically in 1998 and 2010. The anticipated increased frequency and intensity of storm events have the potential to exacerbate the loss of sediment along the shoreline, thereby accelerating the accumulation of sediment on accreting shoreline reaches. These likely future conditions add emphasis to the need for an effective, long-term, beach restoration plan.

The issue of climate change is addressed in this plan to recognize its role in the changing environment, and to provide an understanding of its impacts on the park and

the surrounding environment. The potential influences of climate change are described in the “Affected Environment” chapter. While climate change would alter resource conditions within Indiana Dunes National Lakeshore, the type and intensity of these changes is uncertain.

IMPACT TOPICS RETAINED FOR DETAILED ANALYSIS

NPS Director’s Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* (2001) lists mandatory topics that must be considered in a NEPA document. The impact topics retained for further analysis and their associated issues presented below are described in more detail in the “Affected Environment” chapter, and impacts on each resource are analyzed in the “Environmental Consequences” chapter. If impact topics (resources) are unaffected by the project or if the impacts to the resources from the project are at a low to very low level, then the topic was eliminated from further analysis, as described under the “Impact Topics Dismissed from Further Consideration” section of this chapter.

Coastal Processes

Sediment Transport Processes. A coastal zone is a dynamic region where land is sculpted and shaped by wave action and currents. The coastal processes of Lake Michigan historically have shaped Indiana Dunes National Lakeshore, and continue to have an effect on the natural features vital to the park, such as beaches and dunes. As the shoreline was modified by human activity over the last century, so too was the effect of the coastal processes on Indiana Dunes National Lakeshore.

Due to the presence of various industrial and navigational structures along Lake Michigan’s southern shore, the transport of sediment along the shoreline has been interrupted. This has resulted in areas of accretion, in which the

beach appears to be increasing in size as more sediment becomes trapped, and areas of erosion, in which sediment is carried away from the shoreline and transported downdrift. The alternatives presented in this plan describe a variety of approaches to mitigate accretion and erosion.

Dune Formation Processes. Dune development occurs when the lake level remains relatively constant, and sediment is deposited, trapped, and held onshore by vegetation. It is vital that the appropriate quantity of sediment be present in the system to allow for such processes to occur. The alternatives presented allow for additional sediment to be placed into the lake system via a variety of approaches. It is important to evaluate the effectiveness of these alternatives on the development of foredune and dune complexes.

Aquatic Fauna

Native Species. An abundance of benthic communities live and flourish in Lake Michigan. Many of these species use the nearshore environment along Indiana Dunes National Lakeshore during some stage of their lives. As these species are an important resource for the park, the National Park Service has responsibility to protect them to the extent possible. The alternatives presented in this plan would affect these species.

Invasive and Nonnative Species. There are several species of invasive and nonnative benthic organisms and fish known to populate the waters along the southern Lake Michigan shoreline. As these species encroach on the park’s waters, the native benthic communities are increasingly at risk of displacement. It is important to assess the potential for the alternatives presented in this plan to introduce, or augment, the spread of the invasive and nonnative species.

Terrestrial Habitat

Native Plant Communities. The National Park Service *Management Policies 2006* requires the National Park Service to protect and conserve native plant and vegetative communities that would be affected by visitors, management actions, and external sources. Actions and alternatives presented in this plan would affect these natural resources. Resource managers are currently tasked with the preservation and restoration of the park's unique natural features.

Invasive and Nonnative Plant Species.

The National Park Service defines nonnative and invasive plant species as "those that occur in a given place as a result of direct or indirect, deliberate, or accidental actions by humans." Nonnative invasive plant species are pervasive throughout the park and surrounding lands. Resource managers must contend not only with current threats posed by nonnative invasive plant species but emerging threats as well. Nonnative invasive plant species have already influenced the various reaches and plant communities in the park. Species of special concern, particularly threatened and endangered species, are detrimentally impacted by the encroachment of invasive plants. National Park Service staff are currently monitoring and managing invasive species that pose direct or indirect impacts to species of special concern and critical habitat. It is important to assess the potential for the alternatives presented in this plan to introduce, or augment, the spread of the invasive and nonnative plant species.

Threatened and Endangered Species and Species of Concern

The Endangered Species Act of 1973, as amended, requires an examination of impacts on all federally listed threatened or endangered plant and animal species. It is a responsibility of the park to conform to this legislation, and to extend protection to state-listed threatened, endangered, or rare species.

The park supports a relatively high concentration of biodiversity, and in turn supports many federal and state threatened and endangered species and species of concern. It provides a mosaic of habitats for terrestrial plants and wildlife in a relatively small area. Many of Indiana's plant species of conservation concern are found at the park, including the federal and Indiana threatened Pitcher's thistle (*Cirsium pitcher*). Of concern are the Karner blue butterfly (*Lycaeides melissa samuelis*), Indiana bat (*Myotis sodalis*), piping plover (*Charadrius melodus*), and eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*).

In this draft EIS the park assesses whether proposed actions and alternatives have no effect; may affect, but are not likely to adversely affect; or are likely to adversely affect federally threatened or endangered species and candidate species. The park is also using this draft EIS to determine if the proposed action and alternatives would destroy or adversely modify critical habitat to the extent that the action would appreciably diminish the value of the critical habitat for the survival and recovery of the species.

Wetlands and Pannes

The aquatic and panne habitats that are contained in the wetland habitats within the project area provide tremendous scientific, educational, and inspirational opportunities. They serve as a transition between Lake Michigan and the beach, and the foredune and dune complexes.

Despite their rarity and relatively small size, pannes hold a vast amount of vascular plant diversity. Many of the plant species found within pannes are located nowhere else in Indiana. They also support numerous insect, mammal, and bird species. These wetlands depend on lake level fluctuation and precipitation for their hydrology, therefore proposed actions and alternatives are reviewed in light of their impacts to the

preservation of function and structure of the aquatic and panne wetland habitats.

Soundscape

The *National Park Service Management Policies 2006* recognize that natural soundscapes are a park resource and call for the National Park Service to preserve, to the extent possible, the natural soundscapes of the parks. It is the responsibility of the park to protect the natural soundscape from degradation due to sounds, which is defined as undesirable human-caused sound or noise. Unnaturally occurring sounds can adversely affect the natural soundscape and other park resources. It can also adversely affect the visitor experience along the shoreline. While Indiana Dunes National Lakeshore is situated within an urban setting with industrial and other facilities adjacent to park boundaries, the soundscape within the project area is dominated not only by human components, but by natural components as well. The alternatives presented in this draft EIS may potentially increase noise levels within portions of the project area.

Visitor Experience

The Indiana Dunes National Lakeshore provides a wide range of recreational opportunities and experiences for visitors. Enjoyment of the beaches and dunes along the shoreline are common pastimes for visitors coming to the park. The natural viewshed afforded to those within the park is also a key resource to be considered. As the alternatives presented in this draft EIS may result in changes to these experiences.

Park Operations

Park management and operations refers to the current staff available to adequately protect and preserve vital park resources and provide for an effective visitor experience. Shoreline restoration and management activities have

the potential to impact staffing levels, staff workloads, and the budget necessary to conduct park operations.

IMPACT TOPICS DISMISSED FROM FURTHER CONSIDERATION

Due to the scope of this project, several impact topics have been considered and ultimately dismissed from further discussion because of the low to very low level of impacts.

Air Quality

Since 1988, the EPA, in coordination with state and federal land management agencies, has conducted monitoring of air pollution and visibility at a number of national parks and wilderness areas across the country. The park is located within a class II air quality area because of the heavy industrialization of northwest Indiana. Class I areas have pristine air quality. Class II areas have higher incremental air quality limits than class I areas due to less pristine background air quality, and are allowed moderate air quality deteriorations. The actions associated with the alternatives presented in this plan would not violate air quality standards or result in a cumulative net increase of criteria pollutants under federal or state ambient air quality standards. Emissions from actions in the alternatives would result in negligible effects on air quality, and Indiana Dunes National Lakeshore's class II air quality would be unaffected. This topic has been dismissed from further analysis because there would only be negligible effects on air quality.

Carbon Footprint

For the purpose of this planning effort "carbon footprint" is defined as the sum of all emissions of carbon dioxide and other greenhouse gases (GHG) (e.g., methane and ozone) that would result from implementation of the proposed alternatives.

The proposed action alternatives vary widely in terms of use of vehicles involved in the project and as such the focus of the GHG emissions analysis associated with the alternatives in this draft EIS is on emissions from land- and water-based vehicles (heavy-duty trucks and barges, respectively). Thus, the most energy intensive alternatives were evaluated as shown in Table 1-1: Annual Greenhouse Gas Emissions, for annual GHG emissions using emission factors and calculation methodologies recommended by the EPA Climate Leaders in *GHG Inventory Protocol Core Module Guidance, Direct Emissions from Mobile Combustion Sources* (EPA 2008) for estimating direct GHG emissions resulting from mobile sources. The two most energy intensive alternatives involve 50 to 80 heavy-duty diesel trucks entering the park each day for a period of up to four months during an annual cycle, or up to 18 months during a five-year cycle. The highest expected annual GHG emissions from mobile sources for these alternatives is approximately 3,500 metric tons of carbon dioxide equivalent (mtCO₂e) per year. Other alternatives discussed in this document involve the use of a barge and minimal construction equipment for periods of six or eight weeks. As barges are more efficient at moving dry goods on a ton-per-mile basis, emissions for the remaining alternatives are expected to be much lower.

The 3,500 mtCO₂e GHG emission level is well below the CEQ guidance level of 25,000 mtCO₂e recommended for developing further detailed analysis. To provide a context for these numbers, the total GHG emissions for Indiana Dunes National Lakeshore in 2008 were approximately 5,220 mtCO₂e; GHG emissions for the U.S. Steel Midwest Plant (adjacent to the park) in 2010 were 317,627 mtCO₂e; and the GHG emissions for the state of Michigan in 2002 were 62.5 million mtCO₂e (no GHG inventory has been conducted for the state of Indiana). Thus, the greatest potential GHG emissions from the project, when compared to park baseline emissions in 2008, larger regional and state emissions, and CEQ guidance, are minimal. Therefore, the

actions associated with the alternatives presented in this draft EIS are unlikely to produce more than minor GHG emissions. This topic has been dismissed from further analysis because there would only be minor or less effects from GHG emissions.

TABLE 1-1: ANNUAL GREENHOUSE GAS EMISSIONS

Source	Annual GHG Emissions (Million Metric Tons CO ₂ e)	Year
Alternative B-5	0.0035	N/A
Indiana Dunes National Lakeshore	0.0052	2008
CEQ Guidance	0.0250	N/A
U.S. Steel Midwest Plant (adjacent to the park)	0.3176	2010
State of Michigan	62.5	2002

SOURCES: Mid-Atlantic Diesel Collaborative, 2010; EPA, 2008.

Cultural Resources

Historic Resources. There are several historic structures at the park as well as five houses located along Lake Front Drive in Beverly Shores that were built for the 1933 Century of Progress exposition. There is one identified cultural landscape located on Lake Front Drive in Beverly Shores. These resources are not located within the project area that is the focus of this plan. Historic structures and cultural landscapes at the park would not be impacted by the actions associated with the proposed alternatives, therefore historic structures and cultural landscapes have been dismissed from further analysis.

Submerged Resources. There are several historic shipwrecks offshore from the park, including one or more along the shoreline reaches under analysis for shoreline actions. A Coastal Historic and Cultural Resources Study of the Lake Michigan Watershed was conducted in 2000 for the Indiana Department of Natural Resources (IDNR) Division of Historic Preservation and

Archaeology. The study was performed to assess the status of existing plans and current resources for public recreation access, including offshore shipwrecks, and to make recommendations on feasibility, management need, and demand on resources for recreation access to underwater resources in Lake Michigan. Although the Indiana territorial waters include only 225 square miles of Lake Michigan previous investigations by the Indiana Department of Natural Resources identified the potential for 50 historic vessels. A total of 14 known shipwrecks are listed in the Indiana Maritime Cultural Resource Inventory. Assessment and surveys indicate two of these sites, the Muskegon and the J.D. Marshall, have attributes for potential enhanced recreational value. The J.D. Marshall is located under 30 to 35 feet of water more than 3,000 feet offshore from Indiana Dunes National Lakeshore, while the Muskegon is located under 25 to 30 feet of water more than 1,000 feet offshore from Mount Baldy along the shoreline at Indiana Dunes National Lakeshore (The Office of Underwater Science 2000).

Shoreline restoration activities under analysis in this plan would be closer to the shoreline than most of the historic shipwrecks. A series of mitigation measures would be used to protect submerged resources during nourishment activities associated with the proposed alternatives. These measures would include the use of protective fences and buoys, and signs. With protective measures in place to preserve submerged historic shipwrecks, these submerged resources would be minimally impacted by the actions associated with the proposed alternatives. Therefore, submerged historic resources have been dismissed from further analysis.

Archeological Resources. There could be archeological resources within the project area at Indiana Dunes National Lakeshore that are currently unknown, and which could become known prior to any beach nourishment activities that may result from this plan. In such instances a series of protection measures would be used to protect

archeological resources. These measures would include the use of protective fences and signs. This topic has been dismissed from further analysis because these measures would result in no effect to archeological resources.

Environmental Justice

Presidential Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-income Populations," requires all federal agencies to incorporate environmental justice into their policies by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs on minorities and low-income populations and communities. The alternatives under consideration in this plan would have no appreciable impact on minorities or low-income populations or communities. The actions in the alternatives would not result in identifiable adverse human health effects, nor would they substantially alter the physical and social structure of the nearby communities. This topic has been dismissed from further analysis because actions associated with the proposed alternatives would have no adverse affect on minority or low-income populations.

Human Health Concerns

Both human and natural pathways that introduce and spread pathogens and other contaminants dangerous to human health exist at Lake Michigan. With increased visitor access to and use of Indiana Dunes National Lakeshore comes an increased risk of exposure to *Escherichia coli* (*E. coli*) and other pathogens. Dredging and sediment disturbance have the potential to release harmful bacteria such as fecal indicator bacteria (*E. coli*) and *Clostridium botulinum*. Berms and permanent bypass systems could attract exotic species (i.e., zebra mussels [*Dreissena polymorpha*] and quagga mussels [*Dreissena rostriformis bugensis*]) which may increase the risk of exposure to botulinum

toxin. Botulinum toxin is a metabolic waste produced under anaerobic conditions by *Clostridium botulinum*, a bacteria that can be found in the tissue of bivalves (e.g., mussels). The risk of botulinum toxin exposure would be diminished as the exotic species would eventually be covered with sediment. It is outside the scope of this plan to control potential pathogens or similar impacts to water quality. To maintain compliance with the Clean Water Act of 1972, the National Park Service cannot knowingly implement actions that would have a detrimental effect on water quality. Therefore, while the alternatives presented in this plan do not propose to remove human health concerns from the waters of Lake Michigan, the proposed project would not be expected to adversely affect Lake Michigan water quality and/or introduce harmful pathogens.

Required permitting conducted prior to dredging, sediment placement, and berm or bypass construction activities would identify mitigation required to protect against human health concerns. Appropriate measures would be taken during the final planning and permitting stages to ensure that the actions conducted along the shoreline comply with the standards upheld by the National Park Service. Actions such as fencing, signs, and visitor education would be used to reduce visitor exposure to pathogens and contaminants. With required mitigation in place to protect human health from harmful bacteria released from dredging and sediment placement activities, there would be negligible impacts to human health. This topic has been dismissed from further analysis because actions associated with the proposed alternatives would have negligible effects on human health.

Socioeconomic Resources

NPS Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* requires consideration of potential direct and indirect impacts to the local economy, including impacts to

neighboring businesses in the general project vicinity. The No-action alternative, the preferred alternative, and the other action alternatives considered as part of this plan would not change local and regional land use, nor would they appreciably impact local businesses or other agencies. This resource has been dismissed from further analysis because none of the actions associated with the proposed alternatives has the potential to impact the socioeconomic environment of the area.

Water Quality

Indiana Dunes National Lakeshore, because of the fragmented nature of the lakeshore, the beach, dune complexes, and terrestrial habitats along the shoreline, is impacted by both permitted and nonpoint discharges into Lake Michigan which can directly affect park aquatic resources. It is beyond the scope of this plan to address these discharges into Lake Michigan. The National Park Service cannot knowingly implement actions that would have a detrimental effect on water quality. However, the alternatives in this plan have a very low probability of improving or adversely affecting the water quality of Lake Michigan. Any action taken as part of the implementation of this plan would be subject to any and all appropriate measures to comply with water quality standards. Because the probability of effects to water quality from actions associated with the proposed alternatives is very low, water quality has been dismissed from further analysis.